

1- Define the difference between the **gamma and x-ray**.

What is the **bermstrahlung x-ray**.

if a narrow beam of monoenergetic photons with incident intensity I_0 entering a layer of material with thickness x and the number of photon that interacts with it I^* is given by $I^* = I_0(1 - e^{-\mu x})$ define the **total efficiency**.

Define the **attenuation coefficient** and the **mass attenuation coefficient**.

Explain the **main interaction of gamma-ray with matter** and remark to **its energy rang**.

Explain the **difference between the pair and triple production**.

What we mean by the **mean free path of gamma-ray**.

In radiation physics, measuring and studying the energy gamma spectra emitted from radioisotopes are very important and have many applications, describe four of them.

The radiation gives part or all of its energy to the detector through the interaction and the recording of the event takes place according to the detection system and the deposited energy from the interaction, describe the detection and recording system used for measuring.

Show from a simple graph what we will have if a source emits only one gamma and we measured spectrum and explain due to what that peaks formed.

In intermediate size detectors explain the measured spectrum.

In details explain the **parts of the scintillation detector** and the **measuring mechanism** according to the band theory of solid.

In details explain the **parts of the semiconductor detector** and the **measuring process** due to the junction counter model.

Write down **three advantages and disadvantages of HPGe detector**.

Write down **three advantages and disadvantages of GeLi detector**.

In short details describe the **planer detector**.

The detector measured rate r is related to emit number from the source N by $r = f_1 f_2 f_3 \dots f_n N$ Where the f factors represent the effects of the experimental setup on the measurement. **Explain shortly the main three factors.**

Define the **effective solid angle**.

Define the **source self-absorption factor**.

Define the **source backscattering factor**.

Define the **geometrical efficiency**.

Define the **intrinsic efficiency**.

Define the **total efficiency**.

Define the **intrinsic photopeak efficiency**.

Define the **full energy peak efficiency**.

Define the **photo-fraction (or peak-to-total ratio)**.

Define the **relative efficiency**.

Define the **energy resolution**.

Compare between the **specific ionization** of **alpha and beta** particles.

Define the detector **dead time** and the detector **resolving time**.

Describe the **gas filled detector** and its properties.

Define the **recombination region**.

Define the **height of the detector pulse ΔV** and the **gas amplification factor**.

Define **the fill gas**.

Define the **quench gas**.

Explain shortly the **ionization detector and its properties**.

Show the different ways to use **ionization chamber to detect the neutron plus explain how to reduce the gamma sensitivity**.

Define the **compensated ionization chamber**, explain how its **work plus the percent compensation behavior**.

Explain shortly the **proportional detector and its properties**.

Explain shortly the **Geiger Muller detector and its properties**.

Describe the **self-powered neutron detector mechanism**.

Show how the **wide range fission chamber** work in detection.

In details clarify how the **activation foil and flux wire** used in detection.

In details explain the function of the **photographic film** in measuring of different types of radiation.